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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/804,187	03/19/2004	Takashi Sato	122.1587	6776

21171 7590 06/21/2006

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EXAMINER	
BOLDA, ERIC L	

ART UNIT	PAPER NUMBER
3663	

DATE MAILED: 06/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/804,187	SATO ET AL.	
	Examiner	Art Unit	
	Eric Bolda	3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 May 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3 and 5-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 5-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This Office Action is responsive to Applicant's amendment of May 1, 2006.

Response to Arguments

2. Applicant's argumens regarding 35 U. S. C. 102(b) rejection of claims 1-3, 6-8 and 10-11, rejection of claims 4, 5 and 9 under 103(a), have been considered.

Applicant argues (Argument **A**) that Sulhoff does not disclose that the first pumping light is supplied to the first-stage of the optical amplifier, at the output side of the first stage, in a backwards direction, i. e. counterpropagating to the signal light. The Examiner agrees, however, this feature of the claims is taught in the Drake reference (see 35 U. S. C. 103(a) rejection below).

Applicant argues (Argument **B**) that Drake discloses in Fig. 2 that the pumping sources are only operated one at a time. The Examiner disagrees because the Applicant may have misinterpreted the figure: first, the plot of Fig. 2 does not show pump power as a function of time. Instead it shows pump current as a fraction of the total pump power of the three pumps in Fig. 1. There is clearly a region of operation between A and B in Fig. 2 where both pumps 1 and 2 are provided with current, so that a predetermined ratio exists between these pumping lights. Whether these overlap regions are provided to take into account threshold changes of the laser diode pumping sources over time is irrelevant to Applicants invention as claimed.

Applicant then argues (Argument **C**) that there is no suggestion to combine the pumping arrangement of Sulhoff with the backwards pumping of Drake, and further that the invention of Sulhoff is directed to a significantly different purpose from Applicant's invention, e. g. to ensure that one optical fiber (78) is pumped even when pump (70) is turned off. This argument is not persuausive. In response to applicant's argument that the pumping arrangement in Drake is provided for a different reason that the pumping arrangement in Sulhoff, the fact that Applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Claim Objections

3. Claim 16 is objected to because of the following informalities: "number of input wavelengths" should probably refer to "number of input channels". Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1-3, 6-8, and 10-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sulhoff as applied to claim 1 above and further in view of Drake (US Pat. No. 6,377,394).

With regard to claims 1, 12, and 13 Sulhoff discloses in Fig. 13 a wavelength division multiplexed (WDM) optical amplifier with

- A first stage (76) optical amplifying unit
- A second stage (78) optical amplifying unit arranged in series with the first stage
- A common control unit (44). The control unit uses the optical signals from the input monitor (32) and output monitor (34) to maintain constant gain (automatic gain control). See 5th col. lines 51-63.
- A pumping light distribution function unit ((64) and (84)). The splitter (84) supplies pump light from pump (68) to the first stage optical amplifying unit and second stage amplifying unit.

Sulhoff does not disclose that pumping light distribution unit performs backward pumping on the first stage optical amplifying unit, and forward pumping on the second stage optical amplifying unit. However, Drake teaches in Fig. 1 a two stage optical amplifier with a pump distribution unit (26 and splitter above it) wherein the first stage is pumped at least in a backward direction (p_2) and the second stage is pumped in a forward direction (p_3). It would have been obvious to one skilled in the art (e. g. an optical engineer) to combine the backward pumping of the first stage and forward pumping of the second stage of Drake, with the two stage optical amplifier of Sulhoff, for the purpose of reducing amplified spontaneous emission noise.

With regard to claim 2, the pumping light distribution function unit comprises the splitter (84) and pump (68) of Sulhoff.

With regard to claims 6 and 8, it is inherent that the predetermined distribution ratio of the pumps causes suppression of fluctuations of output due to ASE when the

number of input wavelengths of the optical signal input rapidly decreases. The limitation "able to change said distribution ratio" is easily met by the reference, since different values other than the exemplary 95% /5% splitting can be chosen. Thus, these claims as well as other statements of intended use do not serve to patentably distinguish the claimed structure over that of the reference.

With regard to claims 3 and 14, Sulhoff discloses in Fig. 11 a wavelength division multiplexed (WDM) optical amplifier with

- A first stage (76) optical amplifying unit
- A second stage (78) optical amplifying unit arranged in series with the first stage
- A common control unit (44). The control unit uses the optical signals from the input monitor (32) and output monitor (34) to maintain constant gain (automatic gain control). The common control unit also supplies pumping light to the first and second stage optical amplifying units with a predetermined distribution ratio.
- A first pumping light source (68) for pumping the first stage optical amplifying unit
- A second pumping light source (70) for pumping the second stage optical amplifying unit

Sulhoff does not disclose that pumping light distribution unit performs backward pumping on the first stage optical amplifying unit, and forward pumping on the second stage optical amplifying unit. However, Drake teaches in Fig. 1 a two stage optical

amplifier with a pump distribution unit (26 and splitter above it) wherein the first stage is pumped at least in a backward direction (p_2) and the second stage is pumped in a forward direction (p_3). It would have been obvious to one skilled in the art (e. g. an optical engineer) to combine the backward pumping of the first stage and forward pumping of the second stage of Drake, with the two stage optical amplifier of Sulhoff, for the purpose of reducing amplified spontaneous emission noise.

With regard to claim 7, more that two amplifiers in series may be used (Sulhoff, 15th col. lines 23-35).

With regard to claims 5 and 15, Drake teaches that it is desirable to operate the amplifier with a high pump power input to the first stage to maintain a low noise figure (4th col. lines 51-64). Note that the claimed clause "wherein said predetermined distribution ratio causes an increased gain near an upper limit where oscillation occurs in said first-stage optical amplifying unit so as to obtain a low noise figure" is essentially a statement of intended or desired use. Thus, the claim does not serve to patentably distinguish the claimed structure over that of the references.

With regard to claim 16, it is inherent that the predetermined distribution ratio causes reduced fluctuation at the output side of second optical amplifying medium to be suppressed when the number of input channels of the otpical signal at the input of the first stage decreases (this is what AGC does).

With regard to claims 10 and 11, the optical amplifying medium forming each optical amplifying unit is a rare earth-doped fiber.

With regard to claim 17, the "means for" language of the claim limitation is being treated under 35 U. S. C. 112, 6th paragraph. For the specific structure performing the functional limitations, see Specification, paragraphs [0045]-[0052]. Sulhoff discloses in Fig. 13 a wavelength division multiplexed (WDM) optical amplifier with

- A first stage (76) optical amplifying unit
- A second stage (78) optical amplifying unit arranged in series with the first stage
- A common control unit (44). The control unit uses the optical signals from the input monitor (32) and output monitor (34) to maintain constant gain (automatic gain control). See 5th col. lines 51-63. This constitutes means for casuing the backward pumping light and forward pumping light to be supplied at a predetermined ratio.
- A pumping light distribution function unit ((64) and (84)). The splitter (84) supplies pump light from pump (68) to the first stage optical amplifying unit and second stage amplifying unit.

Alternatively, Sulhoff discloses in Fig. 11 a wavelength division multiplexed (WDM) optical amplifier with

- A first stage (76) optical amplifying unit
- A second stage (78) optical amplifying unit arranged in series with the first stage

- A common control unit (44). The control unit uses the optical signals from the input monitor (32) and output monitor (34) to maintain constant gain (automatic gain control). The common control unit also supplies pumping light to the first and second stage optical amplifying units with a predetermined distribution ratio.
- A first pumping light source (68) for pumping the first stage optical amplifying unit (means for supplying the first stage with pumping light)
- A second pumping light source (70) for pumping the second stage optical amplifying unit (means for supplying the second stage with pumping light)

Sulhoff does not disclose means for supplying the first stage optical amplifying unit with backward pumping light, and means for supplying the second stage optical amplifying unit with forward pumping. However, Drake teaches in Fig. 1 a two stage optical amplifier with a pump distribution unit (26 and splitter above it) wherein the first stage is pumped at least in a backward direction (p_2) and the second stage is pumped in a forward direction (p_3). It would have been obvious to one skilled in the art (e. g. an optical engineer) to combine the backward pumping of the first stage and forward pumping of the second stage of Drake, with the two stage optical amplifier of Sulhoff, for the purpose of reducing amplified spontaneous emission noise.

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sulhoff in view of Drake as applied to claim 8 above and further in view of Ohshima et al. (US Pat. App. Pub. 2001/0050805). Sulhoff discloses all features of the claim except that the distribution ratio control function unit is an optical attenuator able to change the intensity

of the pumping light. However, Ohshima teaches in Fig. 5 an optical amplifier with a single pumping light source (62), and a distribution ratio control function unit comprising an optical splitter (63), and (variable) optical attenuators (53), (64), and (67), capable of changing the intensity of said pumping light. It would have been obvious to one skilled in the art (e. g. an optical engineer) to combine the variable optical attenuators for the pumps as in Ohshima, with the optical amplifier of Sulhoff, for the purpose of to prevent heat emitted by the pumping light source from adversely affecting the amplification medium. Note that the claimed clause "able to change an intensity..." is essentially a statement of intended or desired use. Thus, the claim does not serve to patentably distinguish the claimed structure over that of the references.

Note that the citations made herein are done so for the convenience of the applicant; they are in no way intended to be limiting. The prior art should be considered in its entirety.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Eric Bolda whose telephone number is 571-272-8104. The examiner can normally be reached on M-F from 8:30am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Jack Keith, can be reached on 571-272-6878. Please note the fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

EB

Eric Bolda

JACK KEITH
SUPERVISORY PATENT EXAMINER